WHAT IS CLAIMED IS

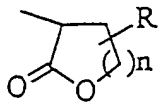
1. An acid-sensitive polymer compound, comprising:

a film-forming polymer;

a carboxyl group bonding to a side chain of said polymer main chain, said carboxyl group having a protective group; and

an additional acidic functional group bonding to a side chain of said polymer main chain, said acidic functional group having an acid-cleavable protective group;

said carboxyl group having, as said protective group, a lactone structure represented by a formula

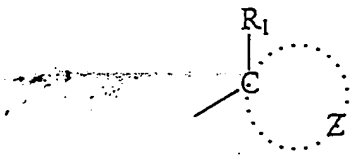


wherein n is an integer of 1 - 4, and R represents any of a hydrogen atom, an alkyl group, an alkoxyl group or an alkoxycarbonyl group and bonding to an arbitrary position of said lactone structure excluding a second position forming an ester bonding.

2. An acid-sensitive polymer compound as claimed in claim 1, wherein said lactone part is formed of 2-hydroxy-τ(gamma)-butylolactone.

3. An acid-sensitive polymer compound as claimed in claim 1, wherein said acid-sensitive polymer includes a monomer unit selected from a group consisting of acrylate and methacrylate monomer unit, a vinylphenol monomer unit and an N-substituted maleimide monomer unit.

4. An acid-sensitive polymer compound as claimed in claim 1, wherein said additional acidic functional group includes an additional carboxyl group having an acid-cleavable protective group, said acid-cleavable protective group having a formula of

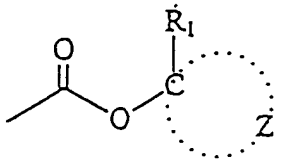


wherein R_1 represents an alkyl group having a straight chain or a branched chain including 1 - 4 carbon atoms, said alkyl group being any of a substituted group and an unsubstituted group, and wherein Z_1 represents a plurality of atoms necessary to complete an alicyclic hydrocarbon group together with the carbon atoms connected to R_1.

5. An acid-sensitive polymer compound as claimed in claim 1, wherein said additional functional group includes a monomer unit having an ester group, said ester group including a polycyclic alicyclic hydrocarbon part that causes a deprotection in response to an acid produced by a photoacid generator.

6. An acid-sensitive polymer compound as claimed in claim 5, wherein said polycyclic alicyclic hydrocarbon part includes an adamantyl group or a norbornyl group.

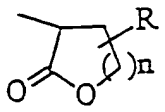
7. An acid-sensitive polymer compound as claimed in claim 4, wherein said additional carboxyl group having a formula of:



wherein R_1 represents an alkyl group having a straight chain or a branched chain including 1 - 4 carbon atoms, said alkyl group being any of a substituted group and an unsubstituted group, and wherein Z_1 represents a plurality of atoms necessary to complete an alicyclic hydrocarbon group together with the carbon atoms connected to R_1.

8. A resist composition, comprising:

an acid-sensitive film-foming polymer insoluble to an alkaline solution; a carboxyl group bonding to a side chain of said polymer's main chain, said carboxyl group having a protective group; and an additional acidic functional group bonding to a side chain of said polymer main chain, said acidic functional group having an acid-cleavable protective group; said carboxyl group having, as said protective group, a lactone structure represented by a formula



wherein n is an integer of 1 - 4, and R represents any of a hydrogen atom, an alkyl group, an alkoxyl group or an alkoxycarbonyl group and bonding to an arbitrary position of said lactone structure excluding a second position forming an ester bonding; and

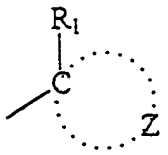
a photoacid generator causing a decomposition in response to an absorption of a radiation, said photoacid generator releasing an acid that causes a deprotection of said acid-cleavable protective group in response to said decomposition;

said resist composition becoming soluble to said alkaline solution after said acid-cleavable protective group has caused said deprotection.

9. A resist composition as claimed in claim 8, wherein said lactone part is formed of 2-hydroxy-τ(gamma)-butylolactone.

10. A resist composition as claimed in claim 8, wherein said acid-sensitive polymer includes a monomer unit selected from a group consisting of acrylate and methacrylate monomer unit, a vinylphenol monomer unit and an N-substituted maleimide monomer unit.

11. A resist composition as claimed in claim 8, wherein said additional acidic functional group includes an additional carboxyl group having an acid-cleavable protective group, said acid-cleavable protective group having a formula of

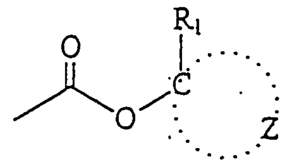


wherein R_1 represents an alkyl group having a straight chain or a branched chain including 1 - 4 carbon atoms, said alkyl group being any of a substituted group and an unsubstituted group, and wherein Z_1 represents a plurality of atoms necessary to complete an alicyclic hydrocarbon group together with the carbon atoms connected to R_1.

12. A resist composition as claimed in claim 8, wherein said additional functional group includes a monomer unit having an ester group, said ester group including a polycyclic alicyclic hydrocarbon part that causes a deprotection in response to an acid produced by a photoacid generator.

13. A resist composition as claimed in claim 12, wherein said polycyclic alicyclic hydrocarbon part includes an adamantyl group or a norbornyl group.

14. A resist composition as claimed in claim 11, wherein said additional carboxyl group having a formula of:



wherein R_1 represents an alkyl group having a straight chain or a branched chain including 1 - 4 carbon atoms, said alkyl group being any of a substituted group and an unsubstituted group, and wherein Z_1 represents a plurality of atoms necessary to complete an alicyclic hydrocarbon group together with the carbon atoms connected to R_1.

15. A resist composition as claimed in claim 8, wherein said resist composition has an absorbance of 1.75 or less when provided on a silicon oxide substrate in the form of a resist film.

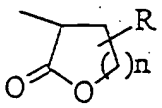
16. A resist composition as claimed in claim 8, further comprising a solvent selected from a group consisting of: ethyl lactate, methylamylketone, methyl-3-methoxypropionate, ethyl-3-ethoxypropionate, propyleneglycol methylether acetate, and a mixture thereof.

17. A resist composition as claimed in claim 16, further including a solvent selected from a group consisting of butyl acetate, τ(gamma)-butylolactone and propyleneglycol methylether as an auxiliary solvent.

18. A method of forming a resist pattern, comprising the steps of:

applying a resist composition on a substrate to form a resist film, said resist composition comprising:

an acid-sensitive polymer compound insoluble to an alkaline solution, said acid-sensitive polymer compound comprising a film-forming polymer; a carboxyl group bonding to a side chain of said polymer main chain, said carboxyl group having a protective group; and an additional acidic functional group bonding to a side chain of said polymer main chain, said acidic functional group having an acid-cleavable protective group; said carboxyl group having, as said protective group, a lactone structure represented by a formula



wherein n is an integer of 1 - 4, and R represents any of a hydrogen atom, an alkyl group, an alkoxyl group and an alkoxycarbonyl group and bonding to an arbitrary position of said lactone structure excluding a second position forming an ester bonding; and

a photoacid generator causing a

decomposition in response to an absorption of a radiation, said photoacid generator releasing an acid that causes a deprotection of said acid-cleavable protective group in response to said decomposition;

said resist composition becoming soluble to said alkaline solution after said acid-cleavable protective group has caused said deprotection;

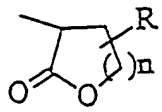
exposing said resist film to an exposure radiation that induces said decomposition in said photoacid generator; and

developing said resist film, after said process of exposing, by a basic solution.

19. A method of forming a resist pattern, comprising the steps of:

applying a resist composition on a substrate to form a resist film, said resist composition comprising:

an acid-sensitive polymer compound insoluble to an alkaline solution, said acid-sensitive polymer compound comprising a film-forming polymer; a carboxyl group bonding to a side chain of said polymer main chain, said carboxyl group having a protective group; and an additional acidic functional group bonding to a side chain of said polymer main chain, said acidic functional group having an acid-cleavable protective group; said carboxyl group having, as said protective group, a lactone structure represented by a formula



wherein n is an integer of 1 - 4, and R represents any of a hydrogen atom, an alkyl group, an alkoxyl group or an alkoxycarbonyl group and connected to an arbitrary position of said lactone structure excluding a second position forming an ester bonding; and

a photoacid generator causing a decomposition in response to an absorption of a radiation, said photoacid generator releasing an acid that causes a deprotection of said acid-cleavable protective group in response to said decomposition;

said resist composition becoming soluble to said alkaline solution after said acid-cleavable protective group has caused said deprotection;

exposing said resist film to an exposure radiation that induces said decomposition in said photoacid generator;

developing said resist film, after said step of exposure, by a basic solution to form a resist pattern; and

etching said substrate while using said resist pattern as a mask.

20. A method as claimed in claim 19, wherein said step of forming said resist film includes a step of applying a solution of said resist composition on said substrate with a thickness of 0.1

- 2 μm.

21. A method as claimed in claim 19, wherein said step of exposing said resist film is conducted by a KrF excimer laser.

22. A method as claimed in claim 19, wherein said step of exposing said resist film is conducted by an ArF excimer laser.

23. A method as claimed in claim 19, wherein said step of developing is conducted by using an alkaline aqueous solution.